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Keywords

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Absence of democracy and gender inequality in education

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Abstract

We investigate empirically how the degree of democracy affects gender equality in education. The dataset contains 66 countries from Asia, Africa, the Middle East and South America over the 1991-2008 period. The results indicate that democracy advances gender equality in education while conversely less democratic regimes discriminate in education against girls. Democratization therefore has an important role in gender equality in education of girls, which, in turn, has a positive influence on economic development and growth.

JEL Codes: O11, O15, O43, O57.

Keywords: Gender equality, gender discrimination, education, democracy

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1. Introduction

Education or human capital is a prominent influence on economic growth and development. In particular, educating girls increases human capital and growth (Schultz 1994, Knowles *et al.*, 2002; Klasen, 2002; Dollar and Gatti, 1999). The human capital effect of educating girls is twofold. First, increased human capital of females directly increases incomes and growth. Second, there is an indirect effect through mothers' education because of the positive influence of mothers on the education and health of their children (Schultz, 2002). An important question for economic development is therefore why gender inequality in education is non-uniform.¹

While there are private markets in education, schooling and education are among the primary responsibilities of government. In seeking reasons for gender inequality in education, we therefore focus on political institutions.

Previous studies have found that education has a positive influence on democracy (for example, Castelló-Climent 2008, Barro 1999, Glaeser *et al.* 2004, Papaioannou and Siourounis 2005). Acemoglu *et al.* (2005) suggest however that after inclusion of fixed effects, there is no evidence that education enhances democracy.

In any event, the influence of education on democracy is a long-run process. With democratization taking time, in the shorter run, with institutions in place and changing slowly, causality between education and democracy appears to be that political institutions influence policies and attitudes toward education.²

¹ One of the United Nations Millennium Development Goals (MDG), hoped for but not on line for achievement, was to eliminate gender inequality in education (UN 2008).

² On the related causal relation between income and democracy, see Gundlach and Paldam (2009). Income distribution, itself to an extent politically determined, can influence public spending on education, in particular for example on different levels of education. See for example Di Gioacchino and Sabani (2009) on income distribution and tendencies for public spending on levels of education in high-income countries. In taking political institutions as given, we do not seek to answer the question why countries differ in degrees of democracy. On this question, see Borooah and Paldam (2007).

We study how the degree of democracy affects gender equality in education. Our data is for 66 countries from Asia, Africa, the Middle East and South America over the 1991-2008 period. In section 2 we set out the background for our hypothesis linking gender equality to political institutions. Section 3 reviews previous studies for comparison. Section 4 presents the data and empirical strategy. Section 5 discusses the empirical results. Section 6 concludes.

2. Female education and political institutions

In countries with limited democracy, rulers who seek to sustain political entrenchment are not interested in development of an educated middle class that will demand accountable and transparent government and democratic institutions. Because education is the basis for social mobility and the development of a middle class, less democratic political regimes may therefore avoid providing education for the poorer (and majority) segments of society.³

The positive relation between schooling or human capital and economic growth is well-established but does the degree of democracy also influence gender equality in education. Our hypothesis is that:

The more limited is democracy, the greater is the bias against educating girls, and therefore the greater is gender inequality in education.

Democracy is conducive to, or perhaps synonymous with, gender equality in education. Democracy facilitates gender equality through mobilization of women and

³ See Hillman (2007) for an overview of the incentives of non-democratic governments not to provide quality free-access education. Hillman and Jenkner (2004) describe the attempts of parents in low-income countries to circumvent low-quality or absent government education through user-pay schooling.

electoral accountability (Beer, 2009, p.218). Women can better organize, to express their views and interests, and to obtain and disseminate information. Women may lobby for improving their status through educational development and increased employment opportunities, and also women may in some cases be empowered to positions of leadership. Men may also want more educated women as partners, and want their own female children to receive equal educational opportunities. Democratic institutions provide greater freedom (De Haan and Sturm 2003) that is consistent with policies that do not discriminate by gender.⁴

While economic development results in improved female education and labor-force participation, religious beliefs and other aspects of culture may discourage or prevent women from pursuing education (Dollar and Gatti 1999, Inglehart and Baker 2000). Colonial regimes allowed women to remain disadvantaged.⁵ Women have disproportionately been employed in low-skilled agriculture, for example, in cash crops plantations (Adams 2006). A primary reason why we expect gender inequality in less democratic countries is absence or disregard for the rule of law, and the distinction between strong and weak in determining people's outcomes. Hillman (2004) has described Nietzschean behaviour as the strong being unconstrained by ethics in actions toward the weak. With women are naturally physically weaker than men, in Nietzschean low-income societies women can be expected to be the victims of male domination, which includes adverse discrimination in schooling. If the role of the girl

⁴ Democracy may also influence gender equality in education through indirect effects such as openness to trade. Autocratic states trade less than democracies (Aidt and Gassebner, 2010). Trade openness appears to induce two opposing effects. First, trade induced growth has generated greater inequalities in education in Sub-Saharan African and Arab countries because increased demand for skilled labour has increased wage differentials between skilled and unskilled workers (Balioune-Lutz and Mc Gillivray, 2007). By contrast, increased trade openness has reduced the wage gap between skilled and unskilled workers by increasing the wages of unskilled workers.

⁵ Brown (2000) investigates the effects of colonization and democracy on enrolment for Middle Eastern, African, Asian, Central and South American countries. His results suggest that colonization decreased enrolment ratios in Sub-Saharan-Africa, despite a strong relationship between regime types and enrolment ratios in education.

or woman is no more than to bear children and to provide satisfaction and services to males, education of girls may not enhance the perceived benefits to men, who are the “strong” and dominate the women, who are the “weak”. Women can then also become objects to be purchased for use and traded (Di Tommaso, Shima, Strøm, and Bettio 2009). The uses to which women are subjected do not require education, or indeed education could be an impediment for achieving the objectives sought by men through submission of women.

3. Prior studies

Empirical evidence in prior studies on the influence of democracy on gender equality in education has been mixed. Brown (2004) employed the data of Barro and Lee (1993) on educational attainment. The dependent variable was the average number of years women attended school divided by the average number of years men attended school in 1990. Democracy was measured by the sub-indicators of POLITY III. The independent variables were mean values for each country between 1960 and 1990. The sample consisted of 105 high and low-income countries. The results suggested that only an executive-recruitment sub-component of democracy had a positive influence on gender equality in education.⁶

A study by Beer (2009) considered gender equality and political regimes. Beer considered also women’s representation in the population and labour force. Beer’s results suggest that democracy may have negatively influenced gender equality in educational attainment. Her dependent variable for gender equality in education is the difference between the average years of educational attainment of women and men.

⁶ Time from initiation of suffrage has been used to study educational opportunities for women (Beer 2009). We do not use this variable because of ambiguities in the relation between the right to vote and democracy. In numerous low-income countries, people have the right to vote, or indeed may be compelled to vote, but there is only one candidate for the position of president or other office.

Democracy is measured by the level and stock of the POLITY IV democracy indices, as well as the year in which women gained the right to vote. The sample consisted of 179 developed and developing countries between 1960 and 2004. The results showed that countries with longer-term democracy and longer duration of women's suffrage had higher proportions of female to male life expectancy, lower fertility rates and higher labour force participation rates, due to the ability to advance their interests through voting. However, both the stock of democracy and the year woman gained suffrage had a negative influence on gender equality in education, so contradicting the hypothesized positive relationship between democracy and gender equality in education. The results were sensitive to the inclusion of an illiteracy variable, exclusion of which turned the democracy variable to positive (Beer, 2009, p. 224).

The empirical evidence on the influence of democracy on gender equality in education from the prior studies has inconclusive elements.

4. Data and empirical strategy

4.1 Data

We employ data on girls and boys enrolment ratios in education at the primary and secondary, and tertiary level. Enrolments at the primary and secondary level are measured by one variable. As noted, the dataset contains 66 countries from Africa, Asia, the Middle East and South America for the 1991-2008 period. The panel is unbalanced. We examine annual data in order to utilize all available data.

Table 1 illustrates regional differences in the ratio of girls to boys in primary and secondary, and tertiary education. An enrolment ratio of 1 indicates parity between females and males and deviations below (above) 1 can be interpreted as a degree of male (female) advantage on the enrolment measure. Girls are most

underrepresented in South Asia and Africa. In Chad, for example, the enrolment ratio in primary and secondary education was 0.57 and in tertiary education 0.15. Gender equality has been most pronounced in Central Asia. In Mongolia, for example, the girls-and-boys-enrolment ratio in primary and secondary education was 1.11 and in tertiary education 1.75 on average. Regional differences in education are pronounced at the tertiary level: gender inequality is high in Africa (enrolment ratio 0.63 on average) and low in the Middle East (enrolment ratio 1.36 on average) and South America (girls-and-boys enrolment ratio 1.3 on average). The girl-and-boys enrolment ratios at the primary and secondary level increased from 0.88 on average in 1991 to 0.96 on average in 2007. The girl-and-boys enrolment ratios at the tertiary level increased from 0.80 on average in 1991 to 0.97 on average in 2007.

The means of measurement of democracy have been the POLITY IV and the Freedom House indices. The Freedom House Political Rights index takes on values between 1 and 7, with 1 indicating the highest degree of freedom and 7 the lowest degree of freedom. The POLITY IV democracy index takes on values between 0 and 10 with 0 representing no democracy (full autocracy) and 10 representing full democracy. These indices have, however, been criticized on several grounds (Munk and Verkuilen 2002, Vreeland 2008, Cheibub et al. 2010). For example, Munck and Verkuilen (2002:28) arrive at the conclusion that Freedom House is an index “which [exemplifies] problems in all areas of conceptualization, measurement, and aggregation.” The POLITY IV index has been criticized for similar reasons, but “the usefulness of the POLITY IV dataset lies in its components” (Cheibub et al. 2010: Section 3.3). The POLITY index has five components: XCONST (Constraints on chief executive), XRCOMP (Competitiveness of executive recruitment), XROPEN (Openness of executive recruitment), PARCOMP (Competitiveness of political

participation), and PAREG (Regulation of political participation). In particular, the Chief Executive variable “provides useful information about whether the chief executive has unlimited authority, whether there is a legislature with slight or moderate ability to check the power of the executive, whether the legislature has substantial ability to check the executive, or whether the executive has parity with or is subordinate to the legislature” (Cheibub et al. 2010: Section 3.3). We will therefore employ the Chief Executive variable as a democracy measure.

Cheibub et al. (2010) introduce a Democracy and Dictatorship (DD) measure of political regimes. The DD measure basically distinguishes between regimes in which executive and legislative offices are filled through contested elections and those in which they are not. The DD measure takes on the value 1 for democracies and zero otherwise. See Cheibub et al. (2010) for a more encompassing discussion on classifying democracies and dictatorships.

Figures 1 and 2 illustrate the association between the averaged XTCONST and the DD democracy indices and the girls-and-boys enrolment ratios at the primary and secondary level respectively. Democracy and gender equality in education at the primary and secondary level have been positively associated. In countries such as Chad and Yemen, the girls-and-boys enrolment ratios as well as the democracy variables display low values. In Mongolia and the Dominican Republic, by contrast, gender equality at the primary and secondary level and democracy was positively related. We do not show the respective figures for the girls-and-boys enrolment ratios at the tertiary level and the XTCONST and DD democracy indices. The positive relationship between gender equality at the tertiary level and democracy is somewhat more pronounced than the positive relationship between gender equality at the primary and secondary level and democracy.

4.2 Empirical strategy

The panel data model has the following form:

$$E_{FMit} = \alpha + \beta Democracy_{ijt} + \gamma Time\ Trend_t + \sum_k \delta Region_{ik} + \sum_l \varepsilon Religion_{il} + \sum_m \zeta x_{imt} + \eta Colony_i + u_{it}$$

with $i = 1, \dots, 78$; $j = 1, \dots, 3$; $k = 1, \dots, 5$; $l = 1, \dots, 6$; $m = 1, \dots, 3$; $t = 1, \dots, 19$

where E_{FMit} is the girls and boys enrolment ratio at the the primary and secondary and tertiary level for country i in period t . $Democracy_{it}$ describes the two alternative democracy measures: the Chief in Executive variable and the Democracy-Dictatorship indicator respectively. We include exactly one of the two democracy measures. $Time\ Trend_t$ describes a linear time trend which considers the increasing gender equality in education over time. $\sum_k \delta Region_{ik}$ describes a set regional dummy variables. The regional dummy variables take on the value of one when the considered country belongs to a particular region and zero otherwise. We distinguish between five different regions: Africa, Asia, the Middle East and South America. To avoid multicollinearity between the region dummies, one of the region dummies must function as the reference category (here Africa). The estimated effects of the other region dummies must then be interpreted as deviations from the reference category. $\sum_l \varepsilon Religion_{il}$ describes a set religion dummy variables (see, for example, Dollar and Gatti 1999, and Inglehart and Baker 2000). The religion dummy variables take on the value of one when a particular religion dominated the considered country and zero otherwise. We distinguish between seven different religions: Protestant, Orthodox, Roman Catholicism, Buddhism, Islam, Hinduism and Indigenous Religion.⁷ Our

⁷ Only Benin is coded as Indigenous Religion.

reference category is Protestant (including Anglicans and all other types of Christians who are not Roman Catholic).⁸ Protestantism led to better education (Becker and Woessmann 2009, 2010). We therefore expect negative influences of the religion dummies on gender equality in education compared to the reference category Protestant. $Colony_i$ describes a dummy variable that takes on the value one when the respective country was a British or French colony and zero otherwise. We expect a negative influence of the colony variable on the girls-and-boys enrolment ratios in education.⁹ $\sum_m \zeta x_{imt}$ describes a vector of economic control variables. Following the related studies on democracy and education we include GDP per capita (Dollar and Gatti 1999, Klasen 2002). Gender equality in education is expected to increase with GDP per capita. We also include trade openness (as a share of GDP). The predicted influence of trade-openness on gender equality on education is ambiguous. Higher trade openness could decrease gender equality because in several developing countries unskilled females have been employed in labor intensive export industries (e.g., Cagatay and Ozler 1995, Fontana and Wood 2000, Balliamoune-Lutz and McGillvray 2007). By contrast, higher trade openness could also increase gender equality because trade openness is expected to narrow the wage gap between skilled and unskilled workers and men and women. Higher relative wages may give women access to educational opportunities. We also include several other economic control variables which are not available, however, for the entire sample: employment in agriculture (as a share of total employment) and government expenditure per student at the primary, secondary and tertiary levels. Including these variables significantly reduces the sample though it does not change the inferences at all. We therefore

⁸ The British introduced Christianity to the African and Asian colonies. Most of the African countries are primarily Anglican or protestant and some countries follow their own variants of Christianity such as Independent Black Christian etc.

⁹ Brown (2000) illustrates the effect of colonialism on enrolment and Cooray (2009) the influence of colonialism on the adult literacy rate.

discuss the influence of employment in agriculture and government expenditure on education in the robustness tests section. Table 2 shows descriptive statistics of all variables included.

We now turn to our choice of estimation procedure. The Chief in Executive is entirely time-invariant and the Democracy-Dictatorship variable is time-invariant for several countries of our sample over the 1991-2008 period. For this reason, no additional fixed country effects can be included. We therefore estimate the model with Ordinary Least Squares (OLS) with robust standard errors and include with fixed region effects.

5 Empirical results

5.1 Basic results

Table 3 illustrates the regression results for education at the primary and secondary level. The control variables display the expected signs and are statistically significant in most cases. The linear time trend has a positive sign and is statistically significant at the 1% level. The numerical meaning of the coefficient is that the girls-and-boys enrolment ratio in primary and secondary education increased by about 0.35 percentage points per year. The regional dummy variables are statistically significant at the 1% or 5% level and mostly have positive signs. In column (2) and (4) the Latin American variable has, however, a negative sign which may well arise because of correlation with other explanatory variables. The regional dummy variables indicate that the girls-and-boys enrolment ratios have been higher in Asia and the Middle East compared to Africa (reference category). The religion dummy variables are statistically significant at the 1% level (the Roman Catholic dummy is statistically significant at the 10% level in column 2) and indicate that girls-and-boys enrolment

ratios have been lower in countries with orthodox, Roman Catholic, Buddhism, Islam, Hinduism and Indigenous religion compared to countries with Protestant religion (reference category). The log GDP per capita has the expected positive sign and is statistically significant at the 1% level in columns (2) and (4) and. It shows that the girls-and-boys enrolment ratios increased by about four percentage points when GDP per capita increased by 1%. Trade openness is statistically significant at the 1% level in columns (2) and (4) and has had positive influence on gender equality in education. The numerical meaning of the coefficients it that the girls-and-boys enrolment ratios increased by about 0.06 percentage points when trade as a share of GDP increased by one percentage point. The colony variable displays the expected negative sign and is statistically significant at the 1% level. In former colonies, the enrolment ratios have been about five percentage points lower than in non-former colonies.

The results in Table 3 show that democracy has had a positive influence on gender equality in education: the coefficient of the Chief in Executive variable has a positive sign and is statistically significant at the 1% level in columns (1) and (2). The numerical meaning of the coefficient in column (1) is that a corresponding increase of the variable Chief in Executive variable by one point would increase the girls-and-boys enrolment ratio in primary and secondary education by about 2.0 percentage points. The numerical effect is smaller in column (2). The Democracy-Dictatorship variables in columns (3) and (4) have the expected positive signs but the coefficient in column (3) lacks statistical significance. The numerical meaning of the coefficient in column (4) is that a corresponding the girls-and-boys enrolment ratio in primary and secondary education was about three percentage points higher in democracies compared to dictatorships (column 4).

Table 4 illustrates the regression results for education at the tertiary level. The control variables again display the expected signs. The linear time trend does not, however, turn out to be statistically significant. The log GDP per capita and trade openness variables are again statistically significant at the 1% level, and they are numerically even more important than in Table 3. The democracy variables again turn out to be statistically significant at the 1% level in columns (1), (2) and (4). The results suggest that the girls-and-boys-enrolment ratio increased by about eight percentage points when the Chief in Executive variable increased by one point (columns 1 and 2), was about 17 percentage points higher in democracies compared to dictatorships (column 4).

5.2 Robustness Tests

We checked the robustness of the results in several ways. The results presented in Tables 3 and 4 could suffer from omitted variable bias. We shall therefore include further (economic) control variables. We have included employment in agriculture (as a share of total employment) because employment in agriculture has been traditionally associated with greater gender and income inequality in favour of males. Table 5 shows that employment in agriculture has negatively influenced gender equality in education at the primary and secondary level. Employment in agriculture has the expected negative sign and is statistically significant at the 1% level in columns (1) and (2) but does not turn out to be statistically significant in columns (3) and (4). In any event, including employment in agriculture significantly reduces the sample but does not change the inferences regarding the democracy variables at all.

Government expenditure on education may well influence gender equality in education. We have therefore included government expenditure per student at the primary and secondary and tertiary levels respectively. Including these variables reduces the sample size to about 200 observations. Government expenditure at the primary, secondary and tertiary level has the expected positive signs and is statistically significant at the 5% and 1% level. In any event, including government expenditure per student at the primary and secondary and tertiary level does not change the inferences regarding the democracy variables at all (results not shown).

The model could also be estimated including a lagged dependent variable, employing the Generalized Method of Moments (GMM). We have therefore employed the estimator by Arellano and Bond (1991) and Blundell and Bond (1998) and collapsed the instruments as suggested by Roodman (2006). The Arellano and Bond tests indicate, however, that the dynamic models are misspecified: the error terms of the dynamic models are neither free of first nor second order autocorrelation. The reason for the misspecification of the dynamic models is very likely the strongly unbalanced panel.

Democracies can be coded more expansively. Cheibub et al. (2010) have conservatively coded countries as democracy only if there has been alternation in power. Some countries appear, however, to have "contested" elections for the executive and legislature, but there has never been an alternation of the government in power. The data by Cheibub et al. (2010) also allow considering these cases as democracies in addition to their conservative coding. We have included the more expansive democracy coding. Results suggest that the more expansive democracy variables do not have an influence on gender equality in educations (results not shown).

The sample contains three high income countries: Bahrain, Saudi Arabia and United Arab Emirates. We have excluded these countries in order to investigate whether the results are sensitive to their exclusion/inclusion. Excluding them does not change the inferences at all: t-statistics of the democracy variables even somewhat increase.

We have estimated cross sections for several years. Table 6 shows the results for 1991 and Table 7 shows the results for 2003 respectively. The results for 1991 are meaningful because 1991 is the first year for which data on girls-and-boys enrolment ratios in education are available. The results for 2003 are meaningful because for 2003 data are available for a maximum number of countries. We have kept the number of explanatory variables small in order to preserve acceptable degrees of freedom. The results in Table 6 show that the Chief in Executive variable is statistically significant at the 1% level in column (1) but lacks statistical significance in column (3). The Democracy-Dictatorship variables do not turn out to be statistically significant in Table 6. The results in Table 7 suggest that democracy has had a positive influence on gender equality in education. The democracy variables are statistically significant at the 10% level in columns (2) and (3) and at the 1% level in column (1).

6 Conclusion

Numerous studies have focused on the different disadvantages of government decisions in countries with limited democratic institutions. Such governments have been shown to resist economic development in various ways (Doucouliagos and Paldam, 2008; Hillman, 2007). Using measures of democracy, we have found that the less democracy there is, the greater the discrimination against females in education.

Given the benefits of educating girls, we have therefore identified another significant disadvantage of limited or absent democracy in low-income countries.

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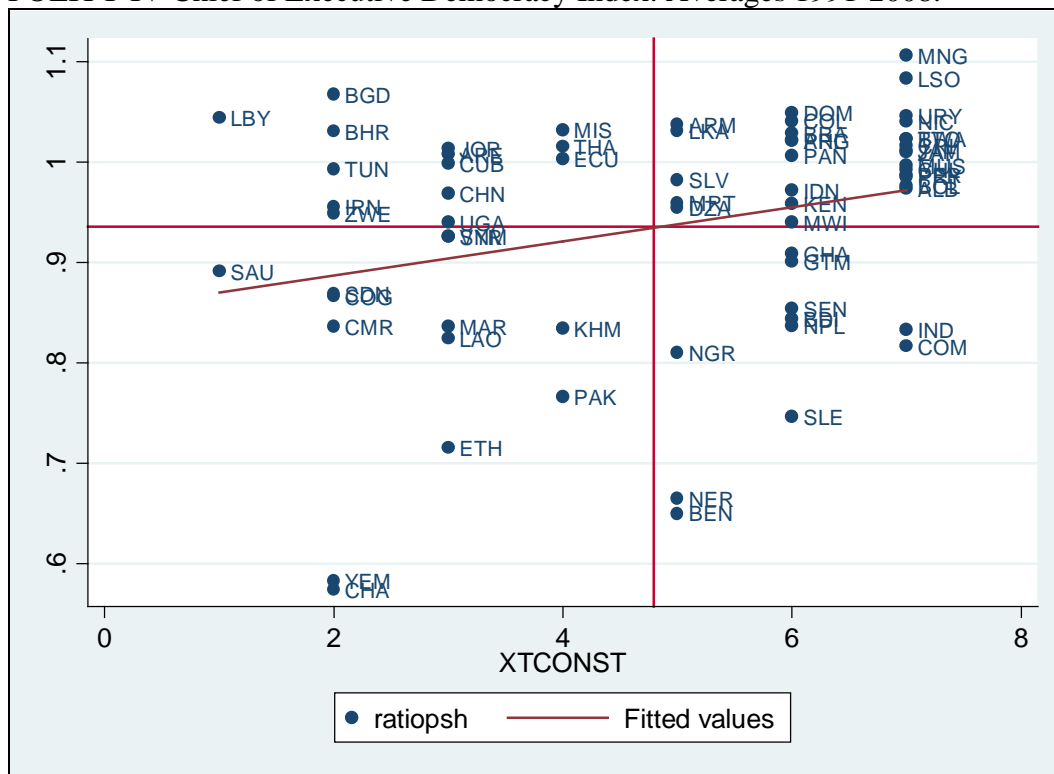
(<http://web.worldbank.org/WBSITE/EXTERNAL/DATASTATISTICS/0,,contentMDK:20398986~menuPK:64133163~pagePK:64133150~piPK:64133175~theSitePK:239419,00.html>) downloaded February 2010.

Appendix

Table A1: Data Description and Source:

Variable	Source
Enrolment ratio of girls in primary and secondary education/enrolment ratio of boys in primary and secondary education 1990-2008	World Development Indicators 2010
Enrolment ratio of girls in tertiary education/enrolment ratio of boys in tertiary education 1990-2008	World Development Indicators 2010.
Polity IV constraints on chief executive	http://www.systemicpeace.org/polity/polity06.htm#nam (downloaded January 2010).
Democracy-Dictatorship dummy variable 1990-2008: Dummy variable coded 1 if the regime qualifies as democratic. The conditions for this variable are the following: democracy=1 if exselec <2 (and) legselec=2 (and) closed=2 (and) dejure=2 (and) defacto=2 (and) defacto2=2 (and) lparty=2 (and) type2=0 (and) incumb=0	Cheibub J, Gandhi J and Vreeland J (2010).
Regional dummy variables: Africa, Asia, Middle East and South America with Africa as the benchmark group.	The Encyclopaedia of World Geography (1994) Bateman G and Egan (Eds.), Andromeda Oxford Limited, England.
Religion dummy variables: seven categories - Protestant, Orthodox, Roman Catholicism, Buddhism, Islam, Hinduism and Indigenous Religion with Protestant as the benchmark group.	The Encyclopaedia of World Geography (1994) Bateman G and Egan V (Eds.), Andromeda Oxford Limited, England.
Colonial State: dummy variable coded 1 if a country was a British or French colony and zero otherwise	Freedom House 2008 : (http://www.freedomhouse.org/template.cfm?page=22&country=7460&year=2008) (downloaded November 2008).
GDP per capita (constant 2000 US\$)	World Development Indicators 2010.
Trade % of GDP	World Development Indicators 2010.
Employment in agriculture % of total employment	World Development Indicators 2010.
Expenditure per student primary % of GDP per capita	World Development Indicators 2010.
Expenditure per student secondary % of GDP per capita	
Expenditure per student tertiary % of GDP per capita	

Figure 1: Girls-and-Boys Enrolment Ratio in Primary and Secondary Education and POLITY IV Chief of Executive Democracy Index. Averages 1991-2008.



Countries included:

Algeria, Argentina, Bahrain, Bangladesh, Benin, Bolivia, Botswana, Brazil, Burundi, Chad, Cambodia, Cameroon, Chile, China, Colombia, Comoros, Congo, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Ethiopia, Ghana, Guatemala, India, Indonesia, Iran, Jamaica, Jordan, Kenya, Lao, Lesotho, Libya, Malaysia, Malawi, Maldives, Mauritania, Mauritius, Mongolia, Morocco, Nepal, Nicaragua, Niger, Nigeria, Pakistan, Panama, Paraguay, Peru, Philippines, Saudi Arabia, South Africa, Senegal, Sierra Leone, Sri Lanka, Sudan, Syria, Thailand, Trinidad and Tobago, Tunisia, Uganda, United Arab Emirates, Uruguay, Vietnam, Yemen, Zimbabwe.

Table 1: The Ratio of Girls and Boys in Primary and Secondary and Tertiary Education

Country	Ratio of Girls/Boys in Primary and Secondary Education (Average 1990-2008)	Frequency	Ratio of Girls/Boys in Tertiary Education (Average 1990-2008)	Frequency	Democracy-Dictatorship (Average 1990-2008)	Frequency
Middle East						
Algeria	0.95	5	1.26	4	0	19
Bahrain	1.03	9	1.97	6	0	19
Iran	0.96	8	0.96	10	0	19
Jordan	1.01	9	1.08	8	0	19
Libya	1.04	4	1.04	5	0	19
Morocco	0.84	9	0.77	10	0	19
Saudi Arabia	0.89	2	1.44	9	0	19
Syria	0.93	10	0.65	1	0	19
Tunisia	0.99	8	1.20	9	0	19
UAE	1.00	10	2.99	7	0	19
Yemen	0.58	6	0.34	5	0	19
Central Asia						
China	0.97	5	0.87	6	0	18
Mongolia	1.11	11	1.75	11	1	18
South and South East Asia						
Bangladesh	1.07	3	0.52	9	0.89	19
Cambodia	0.85	10	0.44	8	0	19
India	0.83	10	0.68	8	1	19
Indonesia	0.97	9	0.83	6	0.53	19
Lao	0.82	10	0.61	9	0	19
Nepal	0.84	10	0.34	6	0.68	19
Malaysia	1.03	9	1.19	9	0	19
Maldives	1.01	8	1.58	3	0.05	19
Pakistan	0.77	5	0.80	7	0.53	19
Philippines	1.02	10	1.07	7	1	19
Sri Lanka	1.03	3	0.55	1	1	19
Thailand	1.02	9	1.16	10	0.84	19
Vietnam	0.93	3	0.74	3	0	19
South America						
Argentina	1.02	9	1.50	9	1	19
Bolivia	0.97	8	0.55	1	1	19
Brazil	1.03	8	1.29	9	1	19
Chile	0.99	10	0.94	9	1	19
Colombia	1.04	11	1.08	11	1	19
Costa Rica	1.02	11	1.09	8	1	19
Cuba	1.00	12	1.49	12	0	19
Dominican Republic	1.05	10	1.59	2	1	19
Ecuador	1.00	10	1.22	1	0.89	19
El Salvador	0.98	11	1.21	10	1	19
Guatemala	0.90	10	0.81	4	1	19
Jamaica	1.01	9	1.79	5	1	19
Nicaragua	1.04	10	1.05	4	1	19
Panama	1.00	10	1.64	9	1	19
Paraguay	0.96	10	1.34	9	1	19
Peru	0.99	11	1.03	6	0.42	19

Country	Ratio of Girls/Boys in Primary and Secondary Education (Average 1990-2008)	Frequency	Ratio of Girls/Boys in Tertiary Education (Average 1990-2008)	Frequency	Democrac y- Dictatorsh ip (Average 1990- 2008)	Frequency
Trinidad and Tobago	1.02	9	1.36	8	1	19
Uruguay	1.05	9	1.78	3	1	19
Africa						
Benin	0.65	8	0.23	4	0.95	19
Botswana	1.02	9	0.84	7	0	19
Burundi	0.84	6	0.40	10	0.37	19
Cameroon	0.84	8	0.68	6	0	19
Chad	0.57	10	0.15	5	0	19
Comoros	0.87	7	0.76	4	1	19
Congo	0.87	5	0.22	6	0.26	19
Ethiopia	0.72	10	0.30	10	0	19
Ghana	0.91	11	0.45	9	0.84	19
Kenya	0.96	10	0.57	6	0.58	19
Lesotho	1.08	10	1.43	8	0	19
Malawi	0.94	10	0.44	10	0.79	19
Mauritania	0.96	10	0.28	7	0.05	19
Mauritius	0.98	9	1.15	10	1	19
Niger	0.67	10	0.31	5	0.63	19
Nigeria	0.81	9	0.63	4	0.53	19
Senegal	0.85	10	0.51	3	0.47	19
Sierra Leone	0.75	3	0.40	2	0.63	19
Sudan	0.87	8	0.91	3	0	19
South Africa	1.01	11	1.05	10	0	19
Uganda	0.94	11	0.52	7	1	19
Zimbabwe	0.95	8	0.57	5	0	19

Note: Average Gender Parity Ratios for period 1990-2008. Source: World Bank (2010).

Table 2: Summary Statistics

Variable	Obs.	Mean	St. Dev	Min	Max	Source
Girls/Boys in Primary and Secondary Education (Ratio)	565	0.94	0.12	0.42	1.23	Worldbank (2010)
Girls/Boys in Tertiary Education (Ratio)	436	0.99	0.54	0	4.0251	Worldbank (2010)
POLITY IV – Constraints on Chief Executive	1235	4.75	1.93	1	7	Marshall and Jaggers (2006)
Democracy-Dictatorship	1254	0.48	0.50	0	1	Cheibub et al. (2010)
GDP per capita (constant prices)	1209	2228.25	3386.98	102.29	25192.33	Worldbank (2010)
Trade Openness (as a share of GDP)	1185	0.74	0.40	0.11	2.20	Worldbank (2010)
Africa	1254	0.35	0.48	0	1	Own Calculation
Asia	1254	0.23	0.42	0	1	Own Calculation
Middle East	1254	0.15	0.36	0	1	Own Calculation
Latin America	1254	0.27	0.45	0	1	Own Calculation
Protestant	1254	0.14	0.34	0	1	Own Calculation
Orthodox	1254	0.02	0.12	0	1	Own Calculation
Roman Catholic	1254	0.32	0.47	0	1	Own Calculation
Buddhism	1254	0.36	0.48	0	1	Own Calculation
Islam	1254	0.11	0.31	0	1	Own Calculation
Hinduism	1254	0.05	0.21	0	1	Own Calculation
Indigenous Religion	1254	0.02	0.12	0	1	Own Calculation
Colony	1254	0.63	0.48	0	1	Own Calculation
Employment in Agriculture (as a share of total employment)	477	25.65	19.25	0	89.3	Worldbank (2010)
Government expenditure per student primary (as a share of GDP per capita)	279	13.70	6.64	2.20	51.14	Worldbank (2010)
Government expenditure per student secondary (as a share of GDP per capita)	250	19.95	13.65	3.89	81.05	Worldbank (2010)
Government expenditure per student tertiary (as a share of GDP per capita)	218	116.77	217.26	8.49	1295.08	Worldbank (2010)
Linear Trend	1254	10	5.48	1	19	Own Calculation

Table 3: Regression results. Dependent variable: Girls/Boys in Primary and Secondary Education (Ratio)
OLS with robust standard errors

Variable	(1)	(2)	(3)	(4)
POLITY IV – Constraints on				
Chief Executive	0.0225*** [6.98]	0.0164*** [5.37]		
Democracy-Dictatorship			0.0102 [0.85]	0.0304*** [3.34]
Linear Trend	0.0044*** [3.57]	0.0035*** [3.89]	0.0040*** [3.04]	0.0029*** [3.17]
Asia	0.0659*** [4.75]	0.0397** [2.50]	0.0727*** [5.21]	0.0457*** [3.32]
Middle East	0.1325*** [7.25]	0.0670*** [3.30]	0.0849*** [4.61]	0.0422** [2.10]
Latin America	0.1044*** [10.76]	-0.0799*** [4.54]	0.1283*** [11.66]	-0.0718*** [4.20]
Orthodox		-0.2008*** [8.69]		-0.2346*** [10.43]
Roman Catholic		-0.0211* [1.71]		-0.0478*** [4.18]
Buddhism		-0.1236*** [10.21]		-0.1454*** [11.26]
Islam		-0.0854*** [4.21]		-0.1199*** [6.83]
Hinduism		-0.1525*** [8.89]		-0.1577*** [9.21]
Indigenous Religion		-0.2636*** [12.99]		-0.2921*** [13.91]
log GDP per capita		0.0408*** [9.03]		0.0428*** [8.86]
Trade Openness		0.0588*** [6.03]		0.0665*** [6.31]
Colony		-0.0697*** [7.16]		-0.0754*** [7.18]
Constant	0.7069*** [28.57]	0.5992*** [14.52]	0.8172*** [39.47]	0.6763*** [18.08]
Obs.	557	524	565	531
R-Squared	0.30	0.66	0.23	0.64

Absolute value of t statistics in brackets; * significant at 10%; ** significant at 5%; *** significant at 1%

Table 4: Regression results. Dependent variable: Girls/Boys in Tertiary Education (Ratio).

OLS with robust standard errors

Variable	(1)	(2)	(3)	(4)
POLITY IV – Constraints on				
Chief Executive	0.0757*** [6.25]	0.0939*** [6.85]		
Democracy-Dictatorship			0.0053 [0.11]	0.1682*** [3.57]
Linear Trend	0.008 [1.23]	0.0018 [0.32]	0.0074 [1.12]	0.001 [0.17]
Asia	0.2959*** [6.20]	0.1417*** [3.67]	0.2900*** [5.28]	0.1398*** [2.78]
Middle East	0.9426*** [9.13]	0.4779*** [6.55]	0.7396*** [7.53]	0.3140*** [4.72]
Latin America	0.5858*** [13.28]	-0.1069 [1.38]	0.6662*** [14.67]	-0.0828 [0.90]
Orthodox		0.2217** [2.27]		0.0217 [0.21]
Roman Catholic		0.1417** [2.52]		0.0137 [0.20]
Buddhism		0.013 [0.23]		-0.1324** [2.38]
Islam		0.1578* [1.86]		-0.0337 [0.35]
Hinduism		-0.2393*** [3.97]		-0.2486*** [4.17]
Indigenous Religion		-0.2237*** [4.84]		-0.3829*** [7.68]
log GDP per capita		0.2470*** [10.30]		0.2524*** [9.84]
Trade Openness		0.1585*** [3.62]		0.2415*** [4.59]
Colony		-0.0323 [0.68]		-0.0651 [1.23]
Constant	0.1522* [1.67]	-1.5008*** [7.76]	0.5298*** [5.98]	-1.0686*** [5.72]
Obs.	433	407	436	409
R-Squared	0.39	0.66	0.32	0.62

Absolute value of t statistics in brackets; * significant at 10%; ** significant at 5%; *** significant at 1%

Table 5: Robustness Tests. Dependent variable: Girls/Boys in Primary and Secondary and Tertiary Education (Ratio). Employment in Agriculture included.
OLS with robust standard errors

Variable	(1)	(2)	(3)	(4)
	Primary and Secondary	Primary and Secondary	Tertiary	Tertiary
POLITY IV – Constraints on Chief Executive	0.0194*** [4.42]		0.0913*** [2.77]	
Democracy-Dictatorship		0.0623*** [4.85]		0.2498*** [2.70]
Linear Trend	0.0011 [0.82]	0.0007 [0.50]	-0.0002 [0.03]	0.0026 [0.39]
Asia	0.0198 [0.80]	0.0063 [0.24]	0.0234 [0.32]	-0.0428 [0.39]
Middle East	0.0379 [1.10]	0.0192 [0.53]	0.4563*** [3.13]	0.2943** [2.41]
Latin America	-0.0578** [2.48]	-0.0882*** [3.90]	-0.1508 [1.47]	-0.2845** [2.27]
Orthodox	-0.1459** [2.59]	-0.2134*** [3.93]	-0.0132 [0.04]	-0.4438* [1.77]
Roman Catholic	0.0184 [0.88]	-0.0219 [1.17]	0.1764 [1.42]	-0.0136 [0.15]
Buddhism	-0.043 [1.60]	-0.0882*** [3.20]	-0.0082 [0.05]	-0.2597** [2.55]
Islam	0.0263 [0.71]	-0.0268 [0.79]	0.2254 [1.08]	-0.0715 [0.48]
Hinduism	-0.1088*** [4.31]	-0.1604*** [5.45]	-0.1848 [1.51]	-0.4240*** [3.02]
Indigenous Religion
log GDP per capita	0.0126* [1.91]	0.0127* [1.80]	0.1818*** [2.64]	0.1467** [2.20]
Trade Openness	0.0521*** [4.26]	0.0563*** [4.46]	0.2024*** [3.29]	0.2919*** [4.53]
Colony	-0.0387** [2.38]	-0.0489*** [3.33]	-0.0869 [1.01]	-0.1445** [2.11]
Employment in Agriculture	-0.1630*** [3.29]	-0.1786*** [3.49]	-0.0896 [0.33]	-0.3114 [1.22]
Constant	0.8038*** [10.18]	0.9385*** [13.28]	-0.913 [1.26]	-0.0492 [0.09]
Obs.	234	236	186	187
R-Squared	0.57	0.57	0.54	0.5

Absolute value of t statistics in brackets; * significant at 10%; ** significant at 5%; *** significant at 1%

Table 6: Robustness Tests. Dependent variable: Girls/Boys in Primary and Secondary and Tertiary Education (Ratio). Cross section for the year 1991.
OLS with robust standard errors

Variable	(1)	(2)	(3)	(4)
	Primary and Secondary	Primary and Secondary	Tertiary	Tertiary
POLITY IV – Constraints on Chief Executive	0.0269*** [3.33]		0.0054 [0.13]	
Democracy-Dictatorship		0.0555 [1.33]		-0.0155 [0.08]
log GDP per capita	0.0624*** [3.87]	0.0554*** [2.73]	0.2363 [1.49]	0.2339 [1.44]
Trade Openness	0.1416*** [2.71]	0.1550** [2.40]	0.4259* [1.71]	0.431 [1.64]
Constant	0.2289** [2.06]	0.3792*** [3.18]	-1.1508 [1.26]	-1.1076 [1.21]
Obs.	50	50	31	31
R-Squared	0.54	0.47	0.40	0.40

Absolute value of t statistics in brackets; * significant at 10%; ** significant at 5%; *** significant at 1%

Table 7: Robustness Tests. Dependent variable: Girls/Boys in Primary and Secondary and Tertiary Education (Ratio). Cross section for the year 2003.
OLS with robust standard errors

Variable	(1)	(2)	(3)	(4)
	Primary and Secondary	Primary and Secondary	Tertiary	Tertiary
POLITY IV – Constraints on Chief Executive	0.0197*** [2.85]		0.0412* [1.74]	
Democracy-Dictatorship		0.0471* [1.98]		0.0379 [0.42]
log GDP per capita	0.0544*** [5.69]	0.0549*** [4.66]	0.2982*** [7.21]	0.2981*** [7.27]
Trade Openness	0.0510* [1.88]	0.0515 [1.65]	0.2873* [1.91]	0.3706** [2.20]
Constant	0.4180*** [5.02]	0.4874*** [6.02]	-1.5425*** [5.96]	-1.4112*** [5.50]
Obs.	57	58	48	49
R-Squared	0.53	0.48	0.72	0.68

Absolute value of t statistics in brackets; * significant at 10%; ** significant at 5%; *** significant at 1%